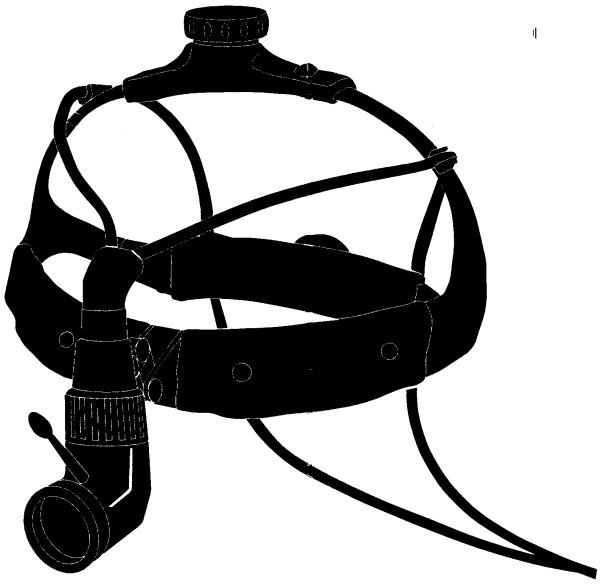
Welch Allyn Multi Fiber Illumination Headlight System

Service Manual



Models: 49540,49520,49522,49524, 49526

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Welch Allyn Inc.
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Welch Allyn™

Part Number 495623 **Rev A.**

Revision (History) Page

Rev.	Description of Change	ECN #	Date	Initial
A	New Release	5-34457	1/14/97	JSJ/MD

To Service Personnel:

The information in this manual is subject to change without notice and should not be construed as a commitment by Welch Allyn, Inc.

Welch Allyn assumes no responsibility for any errors that may appear in this manual. If the product and/or its operation varies significantly from any description herein, please contact the Welch Allyn Product Service Department at 4341 State Street Road, Skaneateles Falls, New York 13153-0220, 1 800 669-9771, (315) 685-4445

This product has been designed to provide a high degree of safety and reliability. However, we can not guarantee against the deterioration of components due to aging and normal wear.

All service and repairs must be performed by authorized Welch Allyn personnel or agents, using Welch Allyn replacement parts. Failure to do so will invalidate the product warranty.

Authorized service centers should refer to repair specification for proper test and device history record requirements.

Please refer to the product warranty for specific coverage.

Welch Allyn™

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Service Manual
Welch Allyn Fiber Optic Headlight System
Table of Contents

Part Number	Model name	Section	Page
49540	Luminaire		
	Disassembly / Repair	1	6-11
49540	Suspension Repair/Adjustment	1	11
495591-502	Headband Assembly	2	12
49543	Fiber optic cable	2	12
all	Required tools	3	13
all	Problem Solving	4	14
all	Recommended spare parts	Appendix A	15-16
all	Drawings and Figures	Appendix A	

- If you have technical questions, or need other assistance, call Welch Allyn customer service personnel at **1-800-669-9771.**

Cleaning Warnings: ***DO NOT IMMERSE the Luminaire in any type of liquid. Do not spray it heavily with any type of liquid. The liquid might enter the Luminaire and create a service problem. DO NOT AUTOCLAVE the whole Luminaire. Only the Joystick is autoclavable separately.***

Follow Cleaning and Maintenance instructions in Owner's Manual PN495608.
Caution: Turn off light source before disconnecting fiber optic bundle from headlight or light source. Clean exterior surfaces of Luminaire, headband, and fiber optic bundle by wiping clean with any of these solutions: Banicide, Cidex, Cidex Plus, Cidex 7, Metracide, 10% Wescodyne, 10% chlorine bleach, 70% Isopropyl alcohol, Wavecide-01, mild soap and water solution.

Table of Reference Drawings (Appendix A)

Drawing #	Description
495540	Welch Allyn Headlight Main Assembly . . .
495570	Suspension / Luminaire Assembly . . . . .
495550	Luminaire Assembly . . . . .

Note that drawings within this manual are for reference only. Consult factory for current revisions.

Abstract of disassembly and reassembly of 49540 Luminaire:

The whole luminaire can be disassembled with the exception of the Mirror and back plate which are pinned and glued to the bottom housing. If moisture is present in the luminaire, replace the iris assembly and clean the lenses by following instructions in this manual. With the exception of the mirror, all components can be replaced as necessary.

The following is the process for completely disassembling and reassembling the luminaire for 'O' ring replacement. "O" rings are used not to seal out moisture but to provide a smooth moveable connection between parts. Only replace 'O' rings if they are worn, cracked, stretched out or missing. If the iris control sleeve is too loose, then the O rings have failed.

1.1 Removing O rings:

__**Unscrew** joystick from the lower housing.

__**Unscrew** the bezel from the luminaire. Use the appropriate collet or equivalent. The bezel is glued on.

__**Unscrew** the top nut. Use collet or equivalent.

__**Pull** the top cap off of lens housing.

__**Remove** O rings.

1.2 Remove Bottom Housing:

__**Unscrew** bottom housing from lens housing. These parts are held together using a thread locking adhesive. Use of a collet will be needed to break the bind of the thread locker.

Note: the back plate and the mirror can not be replaced as they are pinned and glued into the bottom housing. If the mirror is broken or loose, replace the complete bottom housing assembly.

1.3 Remove Iris Assembly:

__**Unscrew** the small pin in the side of the control sleeve. Use 1/16" flat blade screwdriver.

Note: If the iris pin is sheared, it might be removed by grabbing it with a small diagonal cutters and unscrewing it. If not, replace lens housing Asy.

__**Pull** control sleeve from the lens housing.

__**Remove** 'O' rings.

__**Unscrew** the iris retaining nut using the Welch Allyn tool T-14452 or equivalent.

__**Heat** the 2-56 setscrew holding the iris in place before attempting to loosen it. The setscrew can be heated by inserting the hex key into the setscrew and applying heat from a soldering iron to the hex key wrench.

__**Unscrew** the 2-56 setscrew holding the iris in place. Use a .035" hex key.

__**Remove** the iris.

1.4 Remove Condensing Lenses and spacers

__**Heat** the three 2-56 setscrews before loosening due to the threadlocker that is used. The setscrew can be heated by inserting the hex key into the setscrew and applying heat from a soldering iron to the hex key wrench. If the set screws become stripped, then the entire lens and iris assembly will need to be replaced.

__**Unscrew** the three 2-56 setscrews from the lens housing. Use a .035" hex key.

__**Remove:** the spacer, condensing lens, spacer, and small condensing lens.

Re-assembly of model 49540 Luminaire

Special notes for reassembly of Luminaire:

- Refer to assembly drawing 495550 in this manual.
- Use new set screws and 'O' rings when reassembling luminaire.
- Remove any threadlocking adhesive from parts by chasing threads with taps or dies.
- Do not touch lenses or mirror with fingers. Clean them with cotton swabs and lens cleaner.

1.5 Install Condensing Lenses and spacers

__**Insert** clean condensing lens into the lens housing so that the convex portion is up.

__**Insert** a condensing lens spacer into the Lens housing so the large diameter is facing up. Push it down onto the condensing lens.

__**Insert** the next lens (This lens is the same on both sides) into the lens housing on top of the condensing lens spacer.

1.6 Install Iris assembly

__**Insert** the Iris Spacer into the Lens housing chamfered end first. Push it down so it seats on the lens fully.

__**Compress** the spacers and lenses together using T14601 or equivalent. At the same time, dip a set screw into the Loctite 425 threadlocker and **Install** it into one of the three holes in the Lens housing using a .035" Hex wrench.

__**Install** the Iris into the lens housing, with the retaining clip of the Iris assembly facing upwards. There is a slot in the side of the Iris which has a tapped hole located in it. **Align** this tapped hole with the slot in the Lens housing.

__**Screw** T14600 through the slot in the lens housing and into the Iris; finger tighten. **Note:** This is temporary and will be removed after the Iris is locked into place with the Iris retainer.

__**Insert** T14448 into the Lens housing so that the pin in the center of the tool is in the Iris opening and the rubber part of the tool rests on the Iris. **Apply** light downward pressure to T14448 and at the same time, rotate the tool clockwise. Rotating the tool will cause the Iris pin tool 14600 to rotate until it contacts the end of the slot in the lens housing. Continue rotating the tool until the Iris opening closes down onto the pin of T14448.

__**Rotate** the Iris counter clockwise using T14600 until the tool contacts the opposite side of the slot. Hold 14448 steady while performing this operation.

__**Install** a set screw with threadlocker Loctite 425 into the top threaded hole on the Lens housing using a .035" hex wrench; while at the same time, **apply** firm pressure downward with T14448.
Note: Over tightening of this set screw will cause the Iris to bind.

__**Remove** tool T14448.**Apply** 2 to 3 drops of Loctite 425 threadlocker to the Iris retainer threads, then **Install** the Iris retainer using T14452.

Note: When the Iris is at full closed position, a .090" diameter pin should not go through the hole in the center of the Iris. Open and close the Iris; the operation should be smooth.

1.7 Assemble Bottom Housing to Lens Housing

__**Open** the Iris to full open position and **blow** out any dust in the lens housing assembly using an Aero duster or equivalent.

__**Close** Iris.
__**Blow** any dust out of the bottom housing assembly with an aero duster.

__**Apply** 3 to 4 drops of Loctite 425 threadlocker to the large external threads of the lens housing, and **screw** it into the bottom housing. **Tighten** the assemblies together with the appropriate collet.
__**Place** the fiber optic cable leading from the Solarc Light Source into the top of the luminaire assembly.

__**Inspect** the spot for any dirt or dark spots by shinning onto a white piece of paper. Also **Rotate** the Iris and check for proper operation. Any small dust spots not noticed within 2 seconds are generally acceptable. Large, dark or hair-like spots are not acceptable.

1.8 Control Sleeve and Top Cap

__**Install** (2) large O-rings into the lower grooves on the Lens Housing.

__**Install** (1) large O-ring onto the top of the first shoulder of the Lens Housing.

__**Apply** a light coat of Grease to all (3) O-rings.

__**Assemble** the Control Sleeve over the Lens Housing and down to the O-rings. **Rotate** the Control Sleeve so that the hole in the side of it is positioned above the threaded hole in the Iris; seen through the slot in the Lens Housing.

__**Push** Control Sleeve down over the O-rings until seated; being

careful not to rotate the parts.

__**Apply** (1) drop of Loctite Adhesive to the threads of an Iris Pin and install through the hole in the Control Sleeve and into the Iris. Tighten w/ a screw driver until flush or just below.

__**Rotate** Control Sleeve back and forth to spread grease and check for freedom of movement.

__**Install** (1) large O-ring onto the Lens housing and push down until seated on top of the Control Sleeve.

__**Install** (2) large O-rings into the lower exposed grooves on the Lens Housing.

__**Install** (1) small O-ring onto the Lens Housing so that it sit on the shoulder just above the last Large O-ring.

__**Apply** a generous coat of Grease to the 2 lower O-rings.

__**Apply** a coat of Grease to the inside of the Top Cap.

__**Install** a Top Cap onto the Lens Housing so it rests on the O-rings. Rotate the Top Cap while pushing it down over the O-rings. Continue until seated.

__**Install** (1) Small O-ring down on top of the Top Cap.

__**Apply** 2-3 drops of Loctite 425 Threadlocker to the Lens Housing threads.

__**Install** the Top Cap Nut onto the Lens Housing and tighten with the appropriate collet or equivalent.

__**Rotate** the Top Cap a few turns to make sure it rotates smoothly.

Abstract of disassembly and reassembly of 49540 Luminaire Suspension:

The following is the process for adjusting or repairing the luminaire suspension. In most cases the end user will probably indicate that the luminaire no longer stays where it is put. This condition is caused by wear to the friction washers in the suspension mechanism or loosening of the assembly screws. The assembly screw(s) can be tightened to compensate for the wear of the washers or in severe cases, the washers will need to be replaced.

Special notes for repairing the Luminaire Suspension:

- Refer to assembly drawing 495570 in this manual for proper reassembly and torque specifications.
- Reapply threadlocking adhesive (Loctite 425) to any screws that are tightened or loosened.

__**Remove** the setscrews located inside the three pivot nuts, using a 1/16" hex key.

__**Loosen** the three Pivot nuts to break any of the threadlocker free so that the nut turns freely, and blow out any loose debris left from the old threadlocker.

__**Tighten** the three Pivot nuts to the specified torque as described on drawing 495570.

__**Apply** a drop of Loctite 425 threadlocker onto the threads of a setscrew and **install** it into one of the pivot nuts. Tighten with a 1/16" hex wrench. Repeat for the remaining two screws.

Abstract of adjustment / repair of the Headband:

The following is the process for adjusting or repairing the headband. There are only two replaceable components of the headband assembly, the three vinyl pads (1set) and the fiber-optic clips. The fit adjustment controls can be adjusted if the knobs are too hard to turn or if the headband will not maintain it's fit (Loosens).

Special notes for repairing the Headband:

- Refer to assembly drawing 495540 in this manual for further details.
- If the vinyl pads need to be removed and reused, be sure to release snaps by pushing a fingernail or equivalent between the two halves of the snap. The vinyl is extremely thin and will tear if pulled on directly.

2.1 Comfort/Fit Adjustment Knob:

__**Tighten** the screw in the center of the adjustment knob if the headband continues to loosen.

__**Loosen** the screw in the center of the adjustment knob if the knob is too hard to turn.

2.2 Fiber Optic Clips:

__**Remove** the vinyl pad on the top support of the headband assembly. See note above.

__**Unscrew** the two screws that hold the respective clip in place and **Remove** the clip.

__**Reassemble** in reverse order.

Special Notes for the Fiber Optic Bundle:

The Fiber optic bundle (49543) is a multi-fiber cable which transmits the light generated at the light source into the Luminaire Assembly. There is no repair for this item. It must be replaced if the fibers become damaged.

Note: Refer to owner's manual (495608) for cleaning and disinfection.

Broken Fibers?:

__**Hold** one end of the fiber bundle up to a light and look at the other end. Dark areas are broken fibers. The fiber optic cable will need to be replaced if the dark area covers 20% or more of the entire bundle surface.

Tools and Equipment List:

General purpose tools / supplies:

1/16" hex key
.035" hex key
Peer #7 tweezers
4 Flat Blade screwdriver
#2 Phillips screwdriver
#1 Phillips screwdriver
Collet Block
5C Collet for Top Nut Cap (.382")
5C Collet for Lens Housing (.438")
5C Collet for Bezel (1.06")
Jeweler's's flat-blade screwdriver (1.5mm x 40mm) for Iris Pin.
Aero Duster ("canned air") or equivalent. **Compressed air is not recommended due to oils and moisture that are often found in compressed air.**

Welch Allyn tools and fixtures:

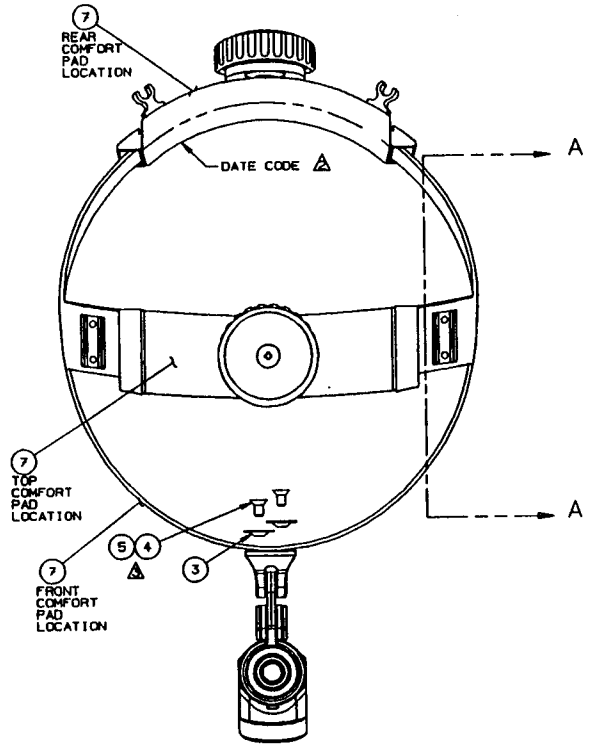
T14600: Extended iris pin.
T14448: Iris aperture adjustment tool.
T14452: Spanner wrench for iris retainer nut.
49501 Solarc Light Source
49543 MFI Fiber Optic Cable

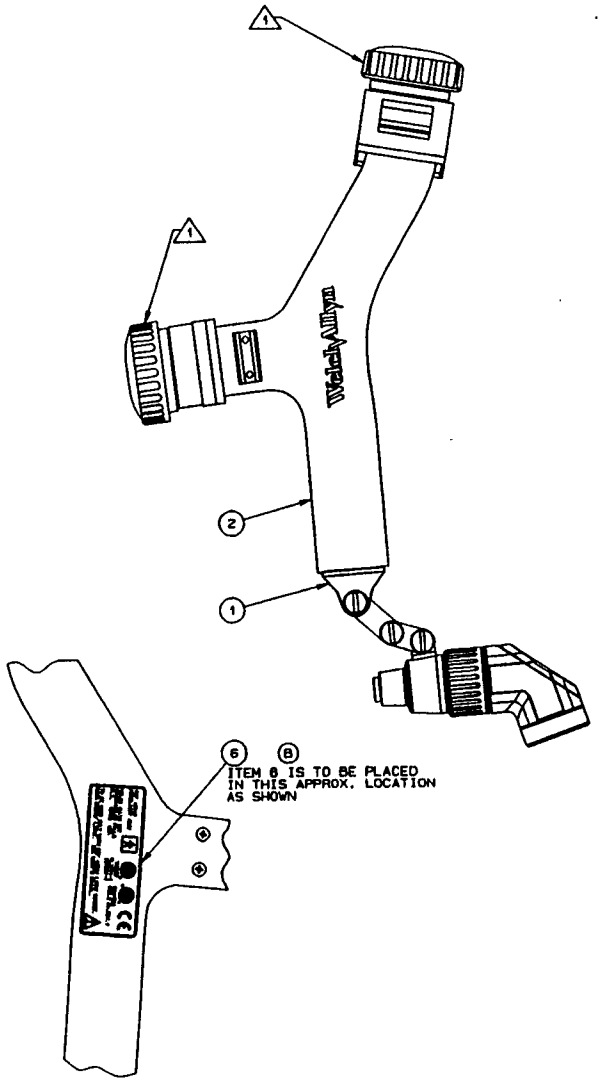
Troubleshooting

Symptom	Possible Cause	Procedure
Low Light Output	Damage has occurred to the fiber optic cable.	Replace the fiber optic cable.
	The attenuator on the light source is turned counter clockwise.	Adjust the attenuator to full bright position.
	The light source is defective.	Repair the light source per service manual 495621.
Light Spot not defined.	The Luminaire may be flooded.	Disassemble the Luminaire and repair as necessary.
Spot size control is hard to turn.	The o-rings are binding.	Replace and lubricate all o-rings.
Luminaire droops.	Friction washers in suspension are worn out.	Readjust suspension or replace washers if necessary.
Headband won't keep desired fit.	The fit adjustment is slipping.	Tighten the adjustment screw on the appropriate adjustment knob.

Part Number	Description	Bubble #	Quantity Luminaire	Drawing Number
495562	BUNDLE CLIPS		4	
495594	WASHER, COUNTERSUNK		2	
495608	MANUAL		1	
49571	JOYSTICK ASSY		1	
495591-502	HEADBAND ASSY TAMPO	0002	1	495540
106102-25	FHPS 6-32 X.312	0004	2	495540
495565-1	LABEL	0006	1	495540
495596-502	PAD SET	0007	1	495540
495573-4	MOUNT,HEADBAND-ANODIZED	0001	1	495570
495572-3	LINKAGE, LONG-ANODIZED	0002	2	495570
106142-8	WASHER, BELVILLE (.375 OD)	0003	6	495570
106103-32	WASHER, FLAT FRICTION	0004	6	495570
495571-3	LINKAGE, SHORT-ANODIZED	0005	2	495570
495577	SPACER, HEADBAND MOUNT	0006	1	495570
495575	NUT, PIVOT	0007	3	495570
495574	SCREW, PIVOT	0008	3	495570
106113-17	SET SCREW (#6-32 X .125)	0009	3	495570
495507-3	TOP CAP NUT ANODIZED	0001	1	495550
495506-2	TOP CAP ANODIZED	0002	1	495550
495505-3	CONTROL SLEEVE ANODIZED	0003	1	495550
106104-33	O-RING	0004	2	495550
106104-32	O-RING	0005	6	495550
495513	SPRING CLIP, FERRULE	0006	1	495550
495504-1	LENS HOUSING	0007	1	495550
495901	CONDENSER LENS #1	0008	1	495550
495509	SPACER-CONDENSER LENS	0009	1	495550
495902	CONDENSER LENS #2	0010	1	495550
495510	SPACER-IRIS	0011	1	495550
710114	2-56 X 1/16 LG SET SCREW	0012	4	495550
495515	IRIS DIAPHRAGM	0013	1	495550
495517-1	PIN,IRIS	0014	1	495550

Part Number	Description	Bubble #	Quantity Luminaire	Drawing Number
495516-1	RETAINER, IRIS	0015	1	495550
495501-9	BOTTOM HSG-ANODIZED	0016	1	495550
495512	JOYSTICK INSERT	0017	1	495550
495903	OBJECTIVE LENS #3	0018	1	495550
495502-3	BEZEL-OBJ LENS ANODIZED	0019	1	495550
495904-1	MIRROR	0020	1	495550
495503-6	MIRROR PLATE ANODIZED	0021	1	495550
106126-22	SPIRAL PIN, (.033 DIA X .125)	0022	2	495550
M30397	LOCTITE 330	0023	0	495550
M30398	LOCTITE 738 ACTIVATOR	0024	0	495550
M30328	LOCTITE 262-31	0026	0	495550
M30373	LOCTITE 425 ASSURE THDLOCKER	0027	0	495550
M40156	DOW CORNING 3452 LUBE	0028	0	495550





NOTES:

(8) 1. TORQUE ON ADJUSTMENT KNOB TO BE 32-48 IN.OZ. WHEN KNOB IS TURNED.

2. STAMP DATED CODE ON REAR RACK AND PINION HOUSING BEFORE ASSEMBLY OF PAD.

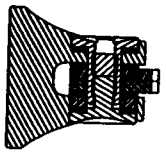
(8) 3. TORQUE TO BE 5.0 ± 1.0 IN-LB.

4. LIGHT TRANSMISSION: 48% MINIMUM WITH IRIS FULLY OPENED, AND USING FIBER BUNDLE 49543, AND 49501 LIGHT SOURCE OR EQUIVALENT.

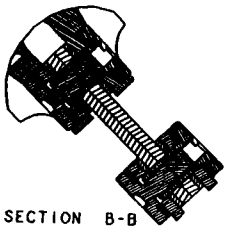
5. SPOT SIZE AT 16" DISTANCE: Ø0.813" ± .063" (IRIS FULLY CLOSED)
Ø3.125" ± .125" (IRIS FULLY OPENED)

REFERENCE DWG #495540

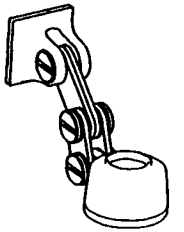
VIEW A-A



SECTION A-A



SECTION B-B



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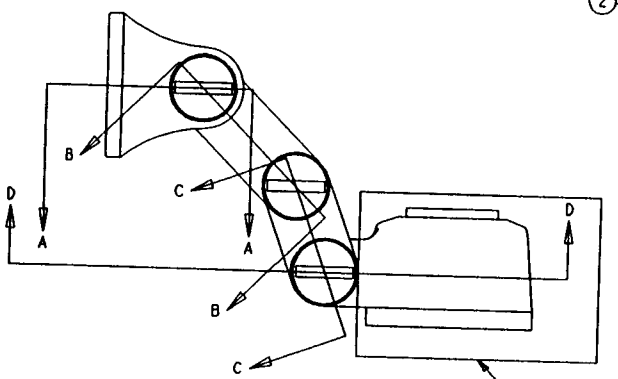
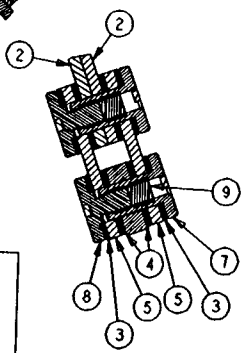
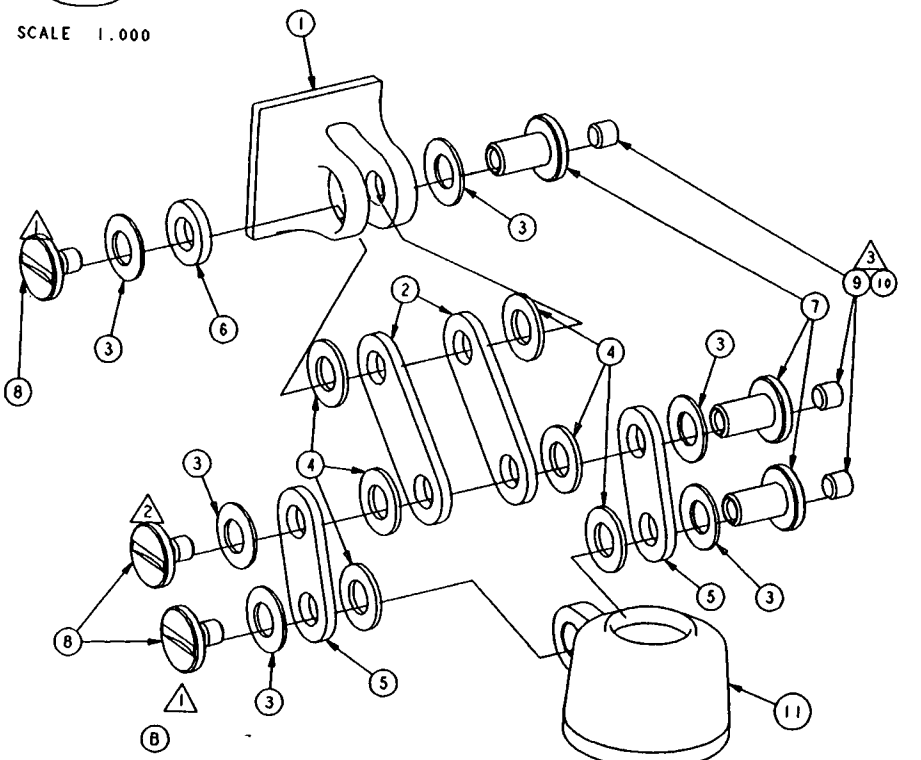
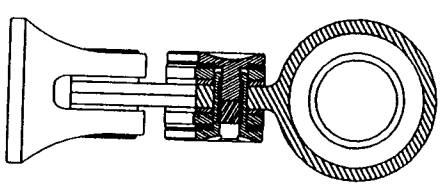




SECTION C-C

ONLY THE TOP CAP OF THE LUMINAIRE ASSY HAS BEEN SHOWN FOR SIMPLICITY.





SECTION D-D

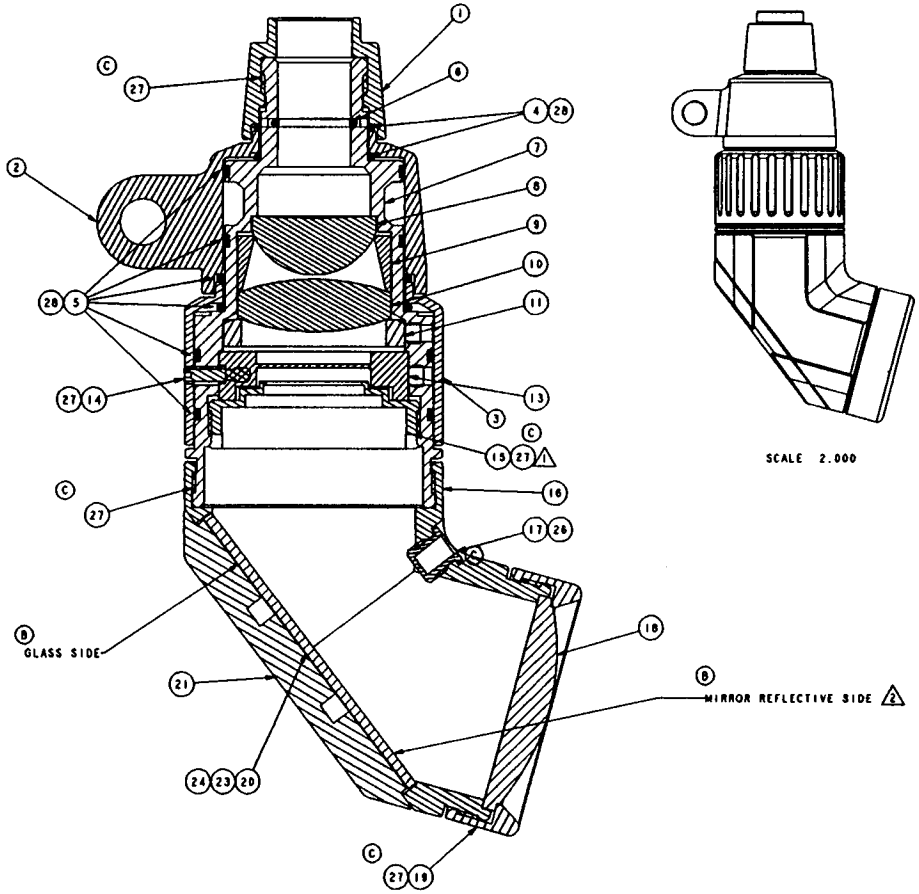
REFERENCE DWG #495570

NOTES:

(B) (1) TORQUE TO 28 ± 1 IN.OZ.

(2) TORQUE TO 20 ± 1 IN.OZ.

(C) (3) TORQUE TO 96 ± 4 IN.OZ.



SECTION A-A

SCALE 2.000

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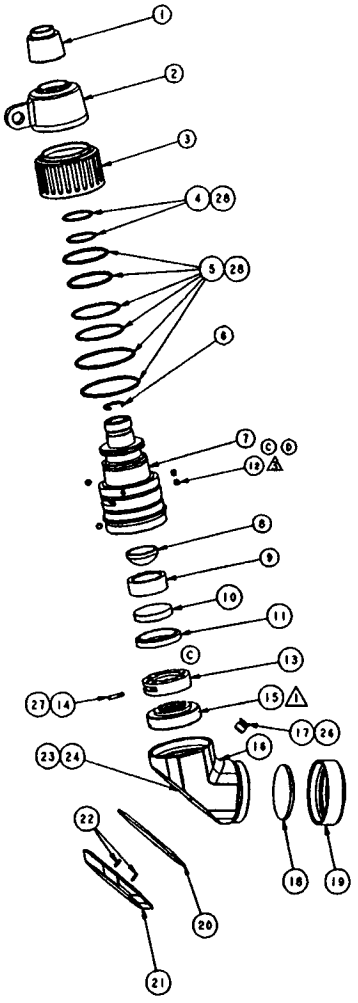

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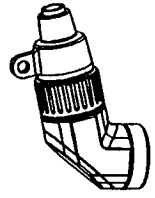

SCALE 1.000

NOTES:

1. TORQUE ITEM 15 TO 7 ± .5 IN.LB.
2. REFLECTIVE SIDE OF MIRROR MUST FACE INSIDE OF LUMINAIRE.
⚠ TORQUE TO 3.0 ±.25 IN.OZ. (4 PLACES).